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# New crops for functional molecules:

# Açai and Blackberry

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# Interest of these fruits

Among the fruit's interest, we are focus on :

- Functional property : The natural red colorant
- Antioxidant property

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# Natural colorants :problematic research

- **Importance of colour in food**

  - Colour is one of the most important attributes affecting consumer acceptance of food

  - Colour mainly defines aesthetic value of food

- **Interest of natural colorants**

  -Real safety of synthetic colorant ?

  -Worldwide tendency toward the use of natural pigments

- **Drawback of natural colorant**

  -Low stability

  -Supply of raw material

# Antioxidant interest: problematic research

- A potential health benefits ?

- Literature gives some values of antioxidant capacity measured by ORAC on pulp fruit

| | Açai | Blackberry | Strawberry | Raspberry |
|---|---|---|---|---|
| **ORAC value** (µmol eq trolox /g) *(Del Pozo Insfran,D.,2007)* | 48,6 - 61,5 | 13,7 - 25,1 | 18,3 - 22,9 | 19,2 - 22,6 |

**ORAC = (Oxygen Radical Absorbance Capacity)**

# Açai

- Açai palm tree

Latin name : *Euterpe oleraceae*

Family : Palmae (Arecaeae)

Native from the Amazon region

# Açai

- Açai fruit

This is a kind of cherry of 1 to 1.5 cm in diameter, violet, becoming nearly black when ripe

The fruit has a single large seed about 7 to 10 mm in diameter

↳ Used to produce energetic snack beverages, ice cream, jelly, and liqueurs.

# Andeans Blackberries

- Blackberry shrub

-The plant is a vigorous shrub of luxuriant growth

-High productivity of fruit between March to April

-Its canes, 3–4 m long, are armed with small hooked prickles.

# Andeans Blackberries

- Blackberry fruit *Family : Rosaceae*

- ***Rubus glaucus* : Mora de Castilla**

  Native from the northern Andes to the southern highlands of Mexico

- ***Rubus adenotrichus* : Mora Común**

  From Mexico to Ecuador

↳ In Latin countries they are important fresh fruits as well as ingredients in jellies, jams, juices, thick syrups and even wines.

# Anthocyanins content

Acai and blackberry are riches in anthocyanins

| Pure juice | Cyanidin-3-glucoside mg / 100 mL | Cyanidin-3-rutinoside mg / 100 mL |
|---|---|---|
| Açai | 65,6 | 156,1 |
| Blackberry | 121,6 | — |

Analysis method : HPLC

# Aim of this study

- 2 raw materials riches in anthocyanins
- Adsorber technology (polymeric adsorbent resins)
- Optimisation of the ACN's purification

**Obtention of natural anthocyanins-enriched and purified extracts as natural food colorant.**

# Anthocyanin molecules

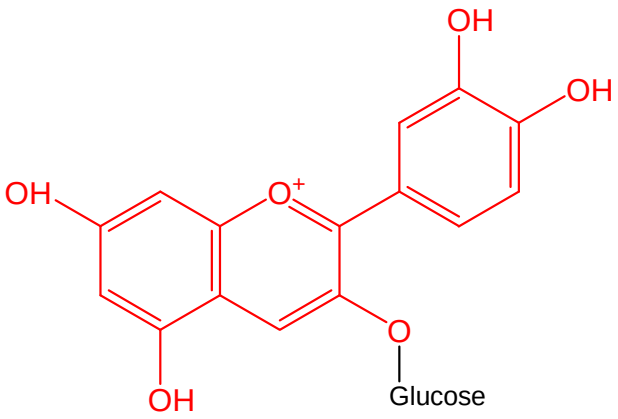
## Characteristics

-Belong to the flavonoid group of polyphenol

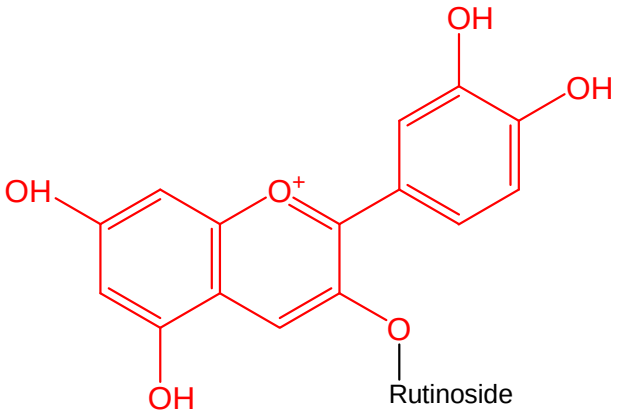
-Water soluble pigments

-Responsible for the red, purple, and blue colors of many fruits, vegetables, and flowers

## Structure




Cyanidin-3-glucoside




Cyanidin-3-rutinoside

# Anthocyanins stability

ACNs are influenced by many factors as:

-pH (varying pH levels induces structural transformations)
-Storage temperature
-Presence of enzymes
-Light
-Structure and ACN content
-Other compounds such as other flavonoids and phenolics.

# Use of polymeric adsorbents (resins) for the purification of ACNs

- **Interest of resins**

-Nonthermal and no chemical anthocyanins purification

-Approved by for food contact use, by the European code of regulation

-Most of the impurities are removed

- **Physical characteristics**

It's a styrene-divinylbenzene copolymerisate polymer with a specific surface area, porosity, and pore radius

- **2 steps process**

1. Adsorption of the ACNs on resins
2. Desorption

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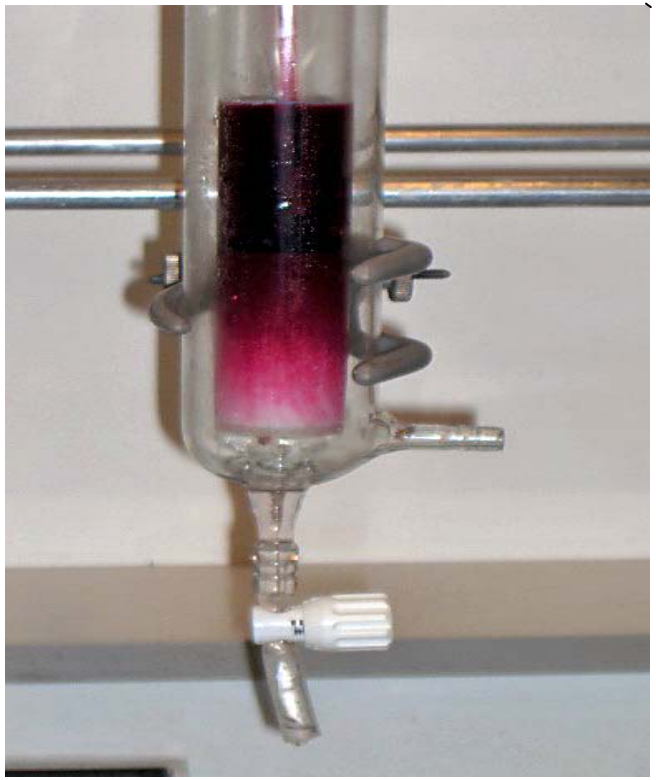
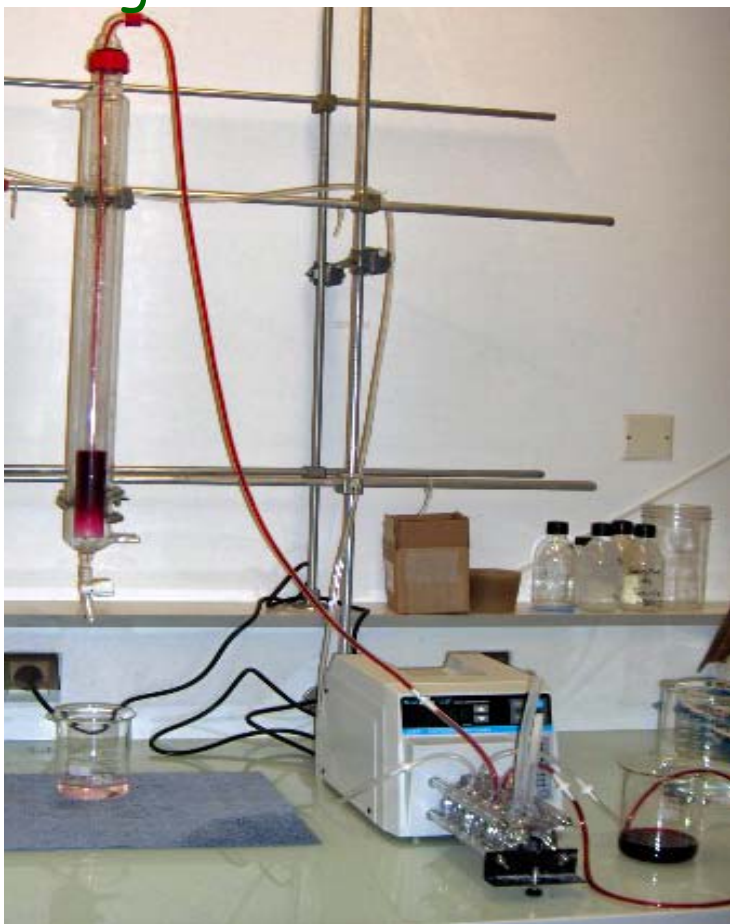
# Process for the purification with resins

## Step1. Adsorption of ACN on resins

↳ Hydrophobic interaction, hydrogen bonding





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# Process for the purification with resins

## Step 2. Desorption

- With an organic solvent which can weaken the attractive forces between the solute and the polymer for removing remove ACNs

At the beginning

At the end

# Result of ACN's purification with resin

| | | Juice | Final Extract | Yield ACN % (extract/juice) | Yield DM % (extract/juice) | Purity of final extract (ACN/DM) |
|---|---|---|---|---|---|---|
| BBerry | ACN contents (mg/100mL) | 40,8 | 130,8 | 96 | 6,05 | 19,46% |
| | $E^{1\%}_{1cm}$ | 4 | 36 | | | |
| | VI / BI | 24,6 | 34,1 | | | |
| Açai | ACN contents (mg/100mL) | 31,2 | 54,3 | 87 | 31,32 | 8% |
| | $E^{1\%}_{1cm}$ | 17,8 | 48 | | | |
| | VI / BI | 54,4 | 51 | | | |

ACN = Anthocyanins

DM = Dry matter

$E^{1\%}_{1cm}$ = Strength colour : correspond to the Abs of (x g) pigment in 100mL buffer pH3

VI = Violet Index ; BI = Brown Index

# Conclusion

The use of resin prove to be an interesting process:

- Simplicity
- Great % of ACN’s recovery
- Increase of the colour strength
- No colour degradation

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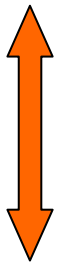
# In prospect(1)

- **Stability test:**
  - Measure the stability of red color in a soft drink solution, at 4°C, 20°C, 30°C, 50°C during 2 months
  - Comparison of different fruit's pigment:
    *Açai, blackberry, black carrot, blackberry+grappe*
- **Economic feasibility study**

  - To know if the pigment of Açai and Blackberry can be use as natural red food colorant

# In prospect(2)

- **ORAC mesure:** Juice/Extract
  - ↳ Degradation during this process ?



- **ACNs content:** Juice/Extract

% ACN's contribution in the antioxidant capacity

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# Thank you for your attention

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